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ENVIRONMENTAL IMPACT RESEARCH PROGRAM BUSH HONEYSUCKLES

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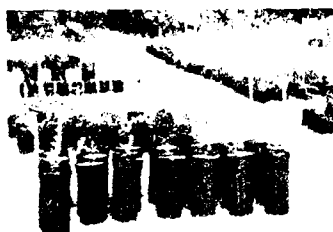
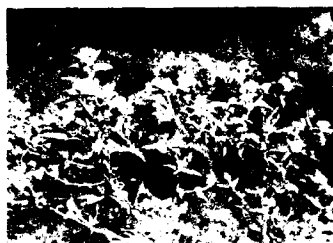
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ENVIRONMENTAL IMPACT
RESEARCH PROGRAM

TECHNICAL REPORT EL-88-4

BUSH HONEYSUCKLES (*LONICERA* SPP.)

Section 7.5.5, US ARMY CORPS OF ENGINEERS
WILDLIFE RESOURCES MANAGEMENT MANUAL

by

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Monitored by Environmental Laboratory
US Army Engineer Waterways Experiment Station
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<p>A plant materials report on bush honeysuckles (<i>Lonicera</i> spp.) is provided as Section 7.5.5 of the US Army Corps of Engineers Wildlife Resources Management Manual; species discussed are the Amur (<i>L. maackii</i>) and Tatarian (<i>L. tatarica</i>) honeysuckles. The report was prepared as a guide to assist the Corps District or project biologist with the selection, cultivation, and management of suitable plant materials for wildlife and habitat development programs. Topics covered include description, distribution, habitat requirements, wildlife value, establishment, maintenance, and cautions and limitations.</p> <p>Amur and Tatarian honeysuckles are introduced shrub species adapted primarily to the northeastern and north-central United States. These species, originally cultivated as ornamentals for landscaping purposes, are also planted for wildlife food and cover. The</p> <p style="text-align: right;">(Continued)</p>					
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Distinguishing characteristics and distribution within the United States are described for each species. Habitat requirements are given, and differences in soil adaptations and cold tolerances are pointed out. The value of planting Amur and Tatarian honeysuckles together is discussed, and the major wildlife species known to use them for food and cover are listed. Guidelines for establishment include specifications for site selection, plot design, propagule selection, and planting methods. Maintenance requirements and management cautions are also noted.



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PREFACE

This work was sponsored by the Office, Chief of Engineers (OCE), US Army, as part of the Environmental Impact Research Program (EIRP), Work Unit 32420, entitled Development of US Army Corps of Engineers Wildlife Resources Management Manual. The Technical Monitors for the study were Dr. John Bushman and Mr. Earl Eiker, OCE, and Mr. David Mathis, Water Resources Support Center. Funding support was also provided by the Department of Defense (DOD) military branches under the DOD Natural Resources Program.

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NOTE TO READER

This report is designated as Section 7.5.5 in Chapter 7 -- PLANT MATERIALS, Part 7.5 -- WOODY SPECIES, of the US ARMY CORPS OF ENGINEERS WILDLIFE RESOURCES MANAGEMENT MANUAL. Each section of the manual is published as a separate Technical Report but is designed for use as a unit of the manual. For best retrieval, this report should be filed according to section number within Chapter 7.

BUSH HONEYSUCKLES (*Lonicera* spp.)

Section 7.5.5, US ARMY CORPS OF ENGINEERS WILDLIFE RESOURCES MANAGEMENT MANUAL

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The bush honeysuckles consist of a group of deciduous and semi-evergreen shrubs belonging to the family Caprifoliaceae. Species discussed in this report are the Amur honeysuckle (*Lonicera maackii*) and Tatarian honeysuckle (*L. tatarica*), both of which were introduced into the United States from Southeast Asia (SCS 1977, DeGraaf and Witman 1979). These species were originally cultivated as ornamentals for landscaping; they are particularly useful as borders, screens, and hedges, and make effective windbreaks and snow fences when planted in long hedgerows (DeGraaf and Witman 1979, SCS 1980). Bush honeysuckles are also planted for their wildlife value, primarily in the northeastern and north-central states (Sharp 1977, DeGraaf and Witman 1979).

DESCRIPTION

Amur and Tatarian honeysuckles are upright deciduous shrubs that grow 8 to 15 ft (2.5 to 4.5 m) tall and have multiple, wide-spreading stems with slightly drooping branches (Dirr 1977, SCS 1977). The simple opposite leaves are ovate-elliptic to ovate-lanceolate in both species (Dirr 1977), but the tips are distinctly more acuminate in Amur honeysuckle (SCS 1977) (Figs. 1 and 2). Amur leaves are dark green, pubescent on the veins, and 1.5 to 3 in. (3.5 to 7.5 cm) long, whereas Tatarian leaves are bluish-green, glabrous, and 1 to 2.5 in. (2.5 to 6.5 cm) in length (Dirr 1977). The older branches of both species have hollow stems (Symonds 1963, SCS 1977).

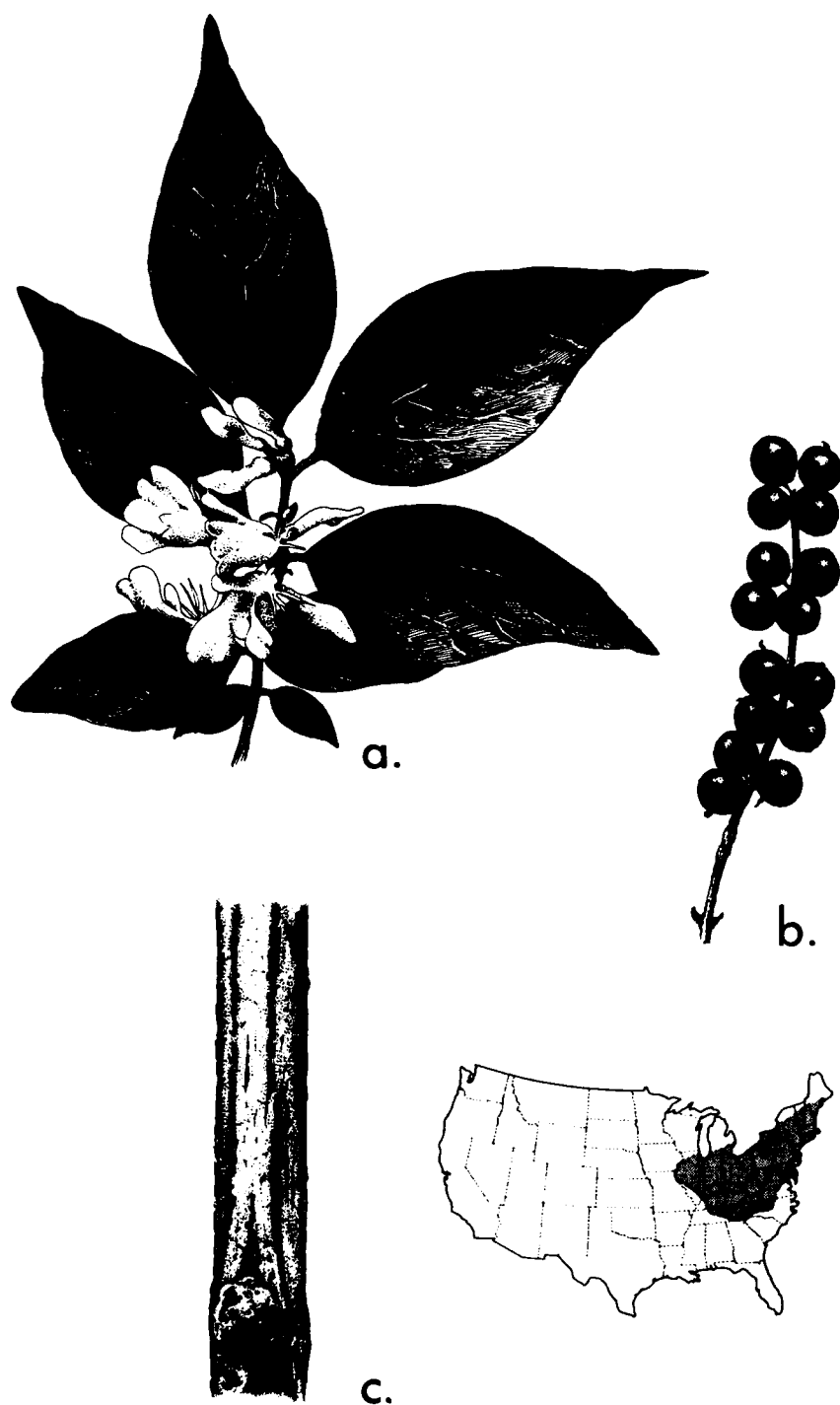
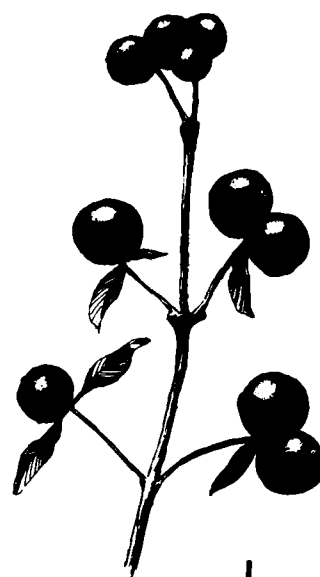


Figure 1. Distribution and distinguishing characteristics of Amur honeysuckle (*Lonicera maackii*): (a) flowering branch and leaves, (b) fruit, and (c) bark



a.



b.



c.

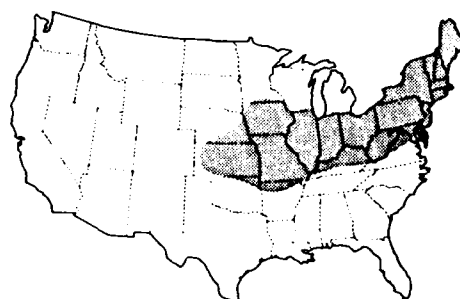


Figure 2. Distribution and distinguishing characteristics of Tatarian honeysuckle (*Lonicera tatarica*): (a) flowering branch and leaves, (b) fruit, and (c) bark

These honeysuckles bear small, fragrant, axillary flowers that bloom profusely in May and June (Dirr 1977, DeGraaf and Witman 1979). The flower, approximately 0.75 in. (2 cm) long, has a bilabiate corolla and stamens that are at least twice the length of the corolla tube (Bailey 1949). The flowers of Tatarian honeysuckle are pink or white, whereas those of Amur honeysuckle are white when they first appear but yellow with age (Nehrling and Nehrling 1968, SCS 1980).

The fruit of both species is a bright red berry approximately the size of a pea, or 0.25 in. (6 to 7 mm) in diameter (Dirr 1977). The berries are arranged in pairs; those of Amur honeysuckle grow close to the stem, but Tatarian berries occupy a terminal position on stalked pedicels (Symonds 1963). The fruit of Tatarian honeysuckle ripens in June and July, whereas that of Amur honeysuckle does not ripen until late September and October (Nehrling and Nehrling 1968, SCS 1980). Amur berries persisting into winter turn dark brown and resemble raisins in appearance (Bailey 1949, SCS 1980). Both honeysuckle species grow rapidly and mature in 4 to 5 years (SCS 1977).

There are many varieties of Tatarian honeysuckle, including 'Nana,' a 3-ft (1-m)-tall dwarf variety valued for its low height (Wyman 1962, Nehrling and Nehrling 1968); 12 commonly planted cultivars were listed by Dirr (1977) for the eastern and midwestern states. Hybrid strains have also been developed between Tatarian and other bush honeysuckles for landscape purposes (e.g., *L. korolkowii*, *L. morrowii*) (Wyman 1962). 'Rem Red,' the only cultivar of Amur honeysuckle, was developed for the Northeast by the USDA Soil Conservation Service at Cape May, New Jersey (SCS 1977).

DISTRIBUTION

Tatarian honeysuckle, native to Turkey and southern Russia, was cultivated in the United States as early as 1752; whereas Amur honeysuckle, native to Korea and Manchuria, was not introduced until about 1860 (Jackson 1974, Dirr 1977). Both species are principally adapted to the northeastern states; Amur honeysuckle is also adapted to the Southeast (Dillon 1975), but the southern limit of Tatarian honeysuckle has not been determined.

Tatarian honeysuckle can be grown from Ontario and Quebec south to New England, New Jersey, Pennsylvania, and Kentucky, and west to Iowa and Kansas (Jackson 1974, Nighswonger 1981). The distribution of Amur honeysuckle extends from southern coastal Maine westward to the Mississippi River and

southward to high elevations in Tennessee and North Carolina (SCS 1977). Dillon (1975) indicated that it can be successfully planted in appropriate locations of the southeastern United States as far south as Florida and as far west as eastern Oklahoma and Texas. Both honeysuckle species have become naturalized throughout much of their ranges (Dirr 1977).

HABITAT REQUIREMENTS

Amur and Tatarian honeysuckles were described by Wyman (1962) as some of the hardiest of the honeysuckle species, showing excellent tolerance to winter average low temperatures between -30° and -20° F (DeGraaf and Witman 1979, SCS 1980). Amur honeysuckle will also grow as far north as Zone 3 (-40° to -30° F), and Tatarian honeysuckle will grow in Zone 2 (-50° to -40° F) (Nehrling and Nehrling 1968).

The honeysuckles prefer deep, rich, well-drained soils but will tolerate somewhat poorly drained soils of medium fertility (SCS 1977, 1980). Tatarian honeysuckle is adapted to many soil textures (Jackson 1974, Nighswonger 1981), whereas Amur honeysuckle grows best on sandy, loamy, or moderately clay textured soils (Sharp 1977, SCS 1980). The latter species does not do well in soils of low fertility and on extremely wet or dry sites (SCS 1980).

Amur honeysuckle is adapted to slightly acid soils, growing best where the pH is greater than 4.8 (Everett, undated). Tatarian honeysuckle prefers neutral to slightly alkaline soils of pH 6.5 to 8.0 (Jackson 1974). Fowler and Adkisson (1980) found that some Amur plants exhibited suitable growth on surface-mined sites in Tennessee with a soil pH range of 2.05 to 3.99; however, overall survival rates were 33% or less. Survival rates were as high as 60% at a pH range of 4.5 to 5.99, but growth rates after 2 years averaged less than 3 in. per plant. Tatarian honeysuckle was found to be totally unsuitable for revegetating these highly acid mine spoils.

Both honeysuckles are tolerant to drought (Sharp 1977). These species tolerate moderate shade but prefer open areas and achieve the greatest fruit production when grown in full sunlight (Jackson 1974, SCS 1980). Under suitable habitat conditions, they grow abundantly and compete strongly with other shrubs, spreading into old fields, open woods, and wastelands (Dirr 1975, SCS 1977) (Fig. 3). However, these species do not usually dominate a site as Japanese honeysuckle (*L. japonica*) often does (Jackson 1974).

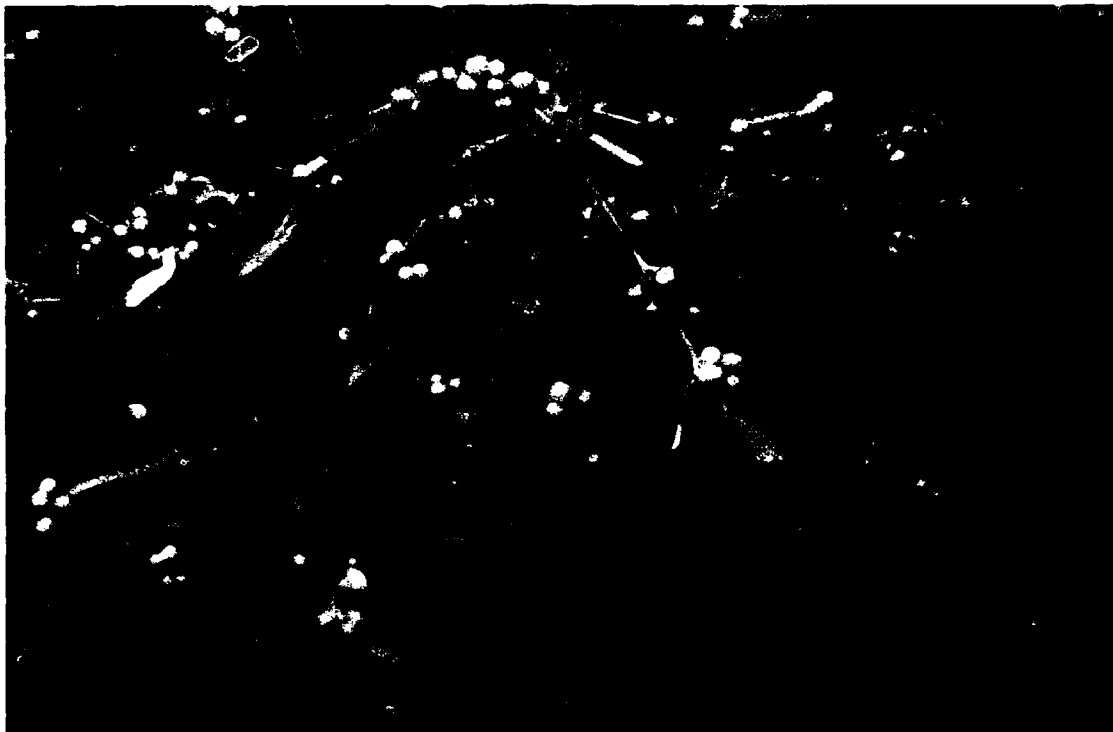


Figure 3. Tatarian honeysuckle thicket along a woodland edge at Mt. Nebo Wildlife Management Area, western Maryland, 25 June 1987 (note abundance of fruit)

WILDLIFE VALUE

Songbirds and a few gamebirds utilize bush honeysuckles extensively (Dillon 1975, SCS 1977, DeGraaf and Witman 1979). The berries are a known food source for at least 20 species of birds in the Northeast (DeGraaf and Witman 1979) and 19 species in the southeastern states (Dillon 1975). Although deer, cottontail rabbits, and mice readily feed on the twigs and bark of Tatarian honeysuckle (Jackson 1974), browsing mammals make only minor use of Amur foliage (SCS 1977). Excellent cover is provided by the bushy growth of these plants, which offer protection for small mammals and ideal nesting sites for small birds (Jackson 1974). A listing of wildlife species known to use bush honeysuckles is presented as Table 1.

When these honeysuckle species are planted together, the persistent fruits constitute a wildlife food source throughout much of the year. Tatarian berries are available from midsummer through early fall, while Amur berries mature in late September and are retained into winter, especially the Rem

Table 1. Wildlife species known to use bush honeysuckles as food and/or cover (after Dillon 1975, DeGraaf and Witman 1979)

Species	Use	
	Food	Cover
<u>Birds</u>		
Wild turkey (<i>Meleagris gallopavo</i>)	x	x
Northern bobwhite (<i>Colinus virginianus</i>)	x	x
Ring-necked pheasant (<i>Phasianus colchicus</i>)	x	x
Ruffed grouse (<i>Bonasa umbellus</i>)	x	x
Northern flicker (<i>Colaptes auratus</i>)	x	
Eastern kingbird (<i>Tyrannus tyrannus</i>)	x	
Northern mockingbird (<i>Mimus polyglottos</i>)	x	x
Gray catbird (<i>Dumetella carolinensis</i>)	x	x
Brown thrasher (<i>Toxostoma rufum</i>)	x	x
American robin (<i>Turdus migratorius</i>)	x	
Hermit thrush (<i>Catharus guttatus</i>)	x	
Eastern bluebird (<i>Sialia sialis</i>)	x	
Cedar waxwing (<i>Bombycilla cedrorum</i>)	x	
European starling (<i>Sturnus vulgaris</i>)	x	
Evening grosbeak (<i>Coccothraustes vespertinus</i>)	x	
Pine grosbeak (<i>Pinicola enucleator</i>)	x	
Purple finch (<i>Carpodacus purpureus</i>)	x	
American goldfinch (<i>Carduelis tristis</i>)	x	
Dark-eyed junco (<i>Junco hyemalis</i>)	x	
White-throated sparrow (<i>Zonotrichia albicollis</i>)	x	
Pine siskin (<i>Carduelis pinus</i>)	x	
Ruby-throated hummingbird (<i>Archilochus colubris</i>)	x	
Woodpeckers (<i>Picoides</i> spp.)	x	
<u>Mammals</u>		
Deer (<i>Odocoileus</i> spp.)	x	
Cottontail rabbits (<i>Sylvilagus</i> spp.)	x	x
Mice (<i>Peromyscus</i> spp.)	x	x

Red variety (SCS 1977). Because birds do not prefer 'Rem Red' fruit in the fall, most of it remains available during the critical winter period after December (SCS 1980). However, this has not been the case in the southern portion of Amur honeysuckle's range in eastern Tennessee. Mixed hedges of Tatarian and Amur honeysuckle, planted at the Nolichucky Environmental Study Area and Wildlife Observation Area by Tennessee Valley Authority (TVA) biologists, have been observed to support heavy use by migrating and wintering songbirds in late summer and autumn; thus, berries are depleted within a relatively

short period after ripening. Although this indicates the value of the species in attracting and supporting songbirds, it does not show that Amur honeysuckle has substantial value as a late winter food throughout its entire range, at least when planted near the earlier maturing Tatarian honeysuckle.

Although wildlife may feed on the fruit because of its availability, some birds show a preference for the berries. Based on studies of food habits, these honeysuckles have been rated as fair food for goldfinches and siskins and as a good forage for mockingbirds, catbirds, thrashers, robins, bluebirds, thrushes, cedar waxwings, evening grosbeaks, and purple finches (Dillon 1975). DeGraaf and Witman (1979) rated Amur and Tatarian berries as preferred food for the gray catbird, American robin, and American goldfinch.

ESTABLISHMENT

Site Selection

Sites considered for honeysuckle establishment need to meet the requirements for the selected species. If used together, however, these bush honeysuckles should be planted on soils to which Amur honeysuckle is best suited, as Tatarian honeysuckle will grow on a wide range of soil types. Soils should be fertile, well drained, and only slightly acid ($\text{pH} = 6.8$) to accommodate both species (Jackson 1974, SCS 1980). For best fruit production the site should be open or less than 50% shaded (SCS 1980).

Plot Design

On suitable sites the bush honeysuckles may be planted in blocks or clumps to form thickets and in strips to form screens or produce edge along woodland borders. Amur and Tatarian honeysuckles can also be established as components of larger shrub communities in patches of several acres. A very efficient use of such patches is for salvaging small sections of "waste" land, or odd areas, by converting it to wildlife habitat (Anderson 1951). Such areas include abandoned roads, borrow pits, gullies, railroad rights-of-way, bare knobs, small sand blowouts, gravel pits, and small eroded areas in crop fields. To be most useful for wildlife, odd areas should be at least $1/4$ acre to several acres in size.

Propagules

The bush honeysuckles may be propagated by seed, seedlings, or stem cuttings. Vegetative propagation is seldom used except for some nursery

plantings (Jackson 1974). Propagation can be accomplished by using hardwood cuttings from established plants in spring or by using leafy softwood cuttings planted under glass or mist-watering systems in summer. Rooting may be improved by treatment with indole acetic acid at 50 mg/l for 24 hr. Sandy soils have been recommended as rooting media (Doran 1957).

Seeds and seedlings are commercially available. Seedlings should be at least 12 to 18 in. tall and have a lower stem diameter of 1/4 to 3/8 in. (SCS 1977, 1980). One-year-old seedlings are usually adequate for field planting, but 2-year-old seedlings have a higher survival rate (Jackson 1974, SCS 1980).

If seed is collected locally, it should be handpicked shortly after ripening to prevent loss to foraging birds. Seeds are readily extracted by dipping macerated berries into a bucket of water and allowing the seeds to fall to the bottom where they can be removed for drying and cleaning (DeGraaf and Witman 1979). Nurserymen at TVA have experienced considerable success in extracting seeds from Amur honeysuckle by refrigerating ripe berries in water for 7 to 10 days before crushing and straining them through a screen box to separate the seed and pulp. The residue is washed into a water bath and the buoyant pulp is skimmed off the surface, leaving the viable seeds at the bottom. Seeds that float with the pulp are usually infertile and therefore discarded. Viable seeds are flushed several times with fresh water to remove any residue, air-dried thoroughly on fine-mesh screen, and stored under refrigeration until planting (Earl Sherwood, TVA, Norris Reservoir, pers. commun., 1985). Seed may also be stored in sealed containers at 34° to 38° F for 15 years with little loss in viability (Heit 1967).

Planting Methods

Transplanting. Bush honeysuckle seedlings should be set out in early spring while they are still dormant. If designed for screens, hedges, or borders, plants should be spaced 1 to 5 ft within rows, and rows should be 4 to 8 ft apart (SCS 1977; Everett, undated). Plants composing blocks or clumps can be spaced further apart, as much as 6 to 8 ft within rows with 10 to 12 ft between rows (SCS 1980). For optimum wildlife use, the best spacing is at 8- to 10-ft intervals with 10 to 15 ft between the rows (Everett, undated). Rows can be double-staggered where shrubs will serve as wind or snow barriers (SCS 1977).

A good procedure for planting seedlings is to remove sod and weeds from a

2-ft-diam circle and dig a small hole to the depth of the root collar in the center of the cleared area. After the seedling is placed into the hole, soil should be firmly tamped around the roots. Seedlings should be watered immediately after transplanting, and the cleared area should be mulched with chips, pine needles, or other appropriate material to retain moisture and suppress competing plants. In poor soils, seedlings may be topdressed with fertilizer several weeks after transplanting (SCS 1980). All seedlings need at least one cultivation to reduce weed competition (Jackson 1974).

Seeding. Bush honeysuckle seeds can be sown either shortly after maturing or in the spring (Jackson 1974). Spring sowing requires cold stratification under nursery conditions to break the embryo dormancy of seeds, but fall planting will accomplish the stratification naturally (SCS 1980). Stratification of seeds for 60 to 90 days at 40° F has been recommended for nursery plantings (Hartmann and Kester 1968, SCS 1980). After spring sowing, germination requires 40 to 60 days (USDA Forest Service 1948).

Seeds should be covered with 1/8 to 1/4 in. of nursery soil that is adequately drained to prevent stems from rotting. Young plants grow best if fertilized and irrigated and may be ready for outplanting as 1- to 2-year-old stock (Jackson 1974).

MAINTENANCE

Once well established, bush honeysuckles require little maintenance. Young plants less than 3 to 4 ft tall should be mulched or cultivated annually to improve survival and growth. Normal survival rates for first- and second-year plantings in suitable soils are approximately 80% (Everett, undated). Dead plants in hedges and screens should be replaced after the first growing season and subsequent winter.

CAUTIONS AND LIMITATIONS

Amur and Tatarian honeysuckles are hardy species that do not require extensive care or attention. However, Amur honeysuckle should be provided with water during extended hot, dry periods because of its susceptibility to severe drought. Both honeysuckles escape into old fields, fencerows, and open woodlands (SCS 1977), but this does not appear to be a problem since these species do not dominate a site to the extent that Japanese honeysuckle does (Jackson 1974).

LITERATURE CITED

- Anderson, W. L. 1951. Making land produce useful wildlife. USDA Soil Conserv. Serv. Farmers' Bull. No. 2035. US Gov. Printing Off., Washington, D.C. 29 pp.
- Bailey, L. H. 1949. Manual of Cultivated Plants Most Commonly Grown in the Continental United States and Canada. MacMillan, New York. 1116 pp.
- DeGraaf, R. M., and G. M. Witman. 1979. Trees, Shrubs, and Vines for Attracting Birds: A Manual for the Northeast. Univ. Mass. Press, Amherst. 194 pp.
- Dillon, O. W., Jr. 1975. Invite birds to your home: Conservation plantings for the Southeast. USDA Soil Conserv. Serv. Program Aid 1093. US Gov. Printing Off., Washington, D.C. 16 pp.
- Dirr, M. A. 1977. Manual of Woody Landscape Plants. Stipes Publ. Co., Champaign, Ill. 536 pp.
- Doran, W. L. 1957. Propagation of woody plants by cuttings. Univ. Mass. Exp. Sta. Bull. 491. 99 pp.
- Everett, H. W. Undated. 'Rem-Red' Amur honeysuckle. USDA Soil Conserv. Planting Guide. USDA Soil Conserv. Serv., Lexington, Ky. Page 5.
- Fowler, D. K., and L. F. Adkisson. 1980. Survival and growth of wildlife shrubs and trees on acid mine spoil. Tech. Note B37. Div. Land and For. Resour., Tenn. Valley Authority, Norris, Tenn. 49 pp.
- Hartmann, H. T., and D. E. Kester. 1968. Plant Propagation: Principles and Practices. 2nd ed. Prentice-Hall, Englewood Cliffs, N.J. 702 pp.
- Heit, C. E. 1967. Propagation from seed. Part II: Storage of deciduous tree and shrub seeds. Am. Nurseryman 126(10):12-13, 86-94.
- Jackson, L. W. 1974. Honeysuckles. Pages 71-82 In J. D. Gill and W. M. Healy, eds. Shrubs and vines for northeastern wildlife. USDA For. Serv. Gen. Tech. Rep. NE-9. Northeast. For. Exp. Sta., Upper Darby, Pa. 180 pp.
- Nehrling, A., and I. Nehrling. 1968. Easy Gardening with Drought-Resistant Plants. Dover Publ., Inc., New York. 320 pp.
- Nighswonger, J. J. 1981. Shrubs that attract songbirds and wildlife. Kans. Community For. Fact Sheet L-586. Coop. Exten. Serv., Kans. State Univ., Manhattan. 2 pp.
- SCS. 1977. Plants for conservation in the Northeast. Conservation Plant Sheet No. 23. USDA Soil Conserv. Serv., Upper Darby, Pa. 2 pp.
- _____. 1980. 'Rem Red' Amur honeysuckle. USDA Soil Conserv. Serv. Program Aid No. 1245. 6 pp.
- Sharp, W. C. 1977. Conservation plants for the Northeast. USDA Soil Conserv. Serv. Program Aid No. 1134. US Gov. Printing Off., Washington, D.C. 40 pp.
- Symonds, G. W. D. 1963. The Shrub Identification Book. William Morrow and Co., New York. 379 pp.

USDA Forest Service. 1948. Woody-plant seed manual. USDA Misc. Publ. 654.
416 pp.

Wyman, D. 1962. The honeysuckles. *Arnoldia* 22:57-68.

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